Small Business Innovation Research/Small Business Tech Transfer

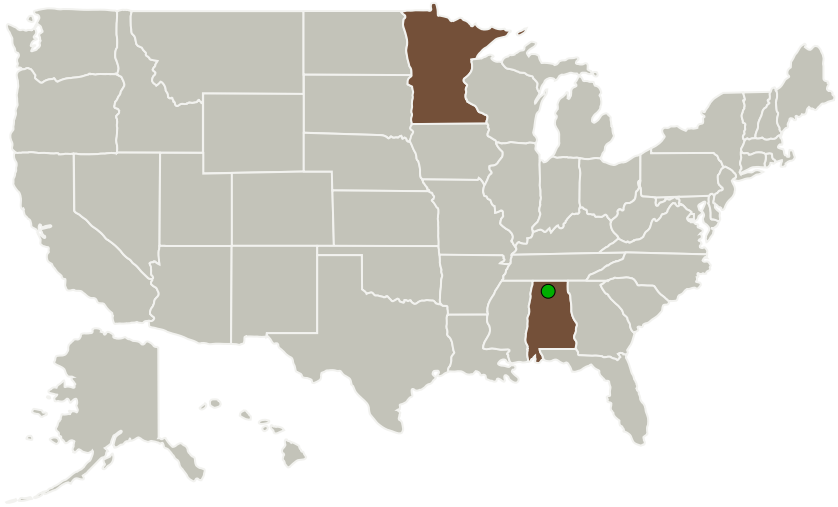
Architecture Framework for Fault Management Assessment and Design (AFFMAD), Phase II

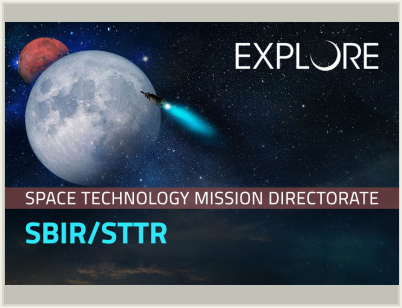
Completed Technology Project (2015 - 2017)

Project Introduction

Architecture Framework for Fault Management Assessment And Design(AFFMAD) provides Fault Management (FM) trade space exploration and rigorous performance constraint checking for FM strategies of complex cyber-physical systems. AFFMAD will assist early evaluation of FM strategies and improve the efficiency of implementing and testing those strategies much earlier in the design process than today. With AFFMAD, FM engineers will be able systematically generate, analyze, and trade-off FM strategies at the system-level within a multi-discipline modeling framework. Focusing on the early design phases will reduce the technical, schedule, and cost risk of Science Mission Directorate (SMD) missions. A key innovation of the AFFMAD approach is to represent the FM models in a form that supports iteration over alternative FM strategies in order to optimize overall mission success. We accomplish this by building abstract FM cyber-physical models, annotating them with both FM characteristics and mission costs (e.g., Size, Weight, and Power (SWAP), latency, throughput), and using external tools to iteratively explore the state space of feasible FM strategies. At each iteration, AFFMAD collects performance and cost information about each alternative in the context of each mission phases as well as the entire mission.

Primary U.S. Work Locations and Key Partners





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Organizations Performing Work	Role	Type	Location
Adventium Enterprises, LLC	Lead Organization	Industry	Minneapolis, Minnesota
Marshall Space Flight Center(MSFC)	Supporting Organization	NASA Center	Huntsville, Alabama

Primary U.S. Work Locations	
Alabama	Minnesota

Project Transitions

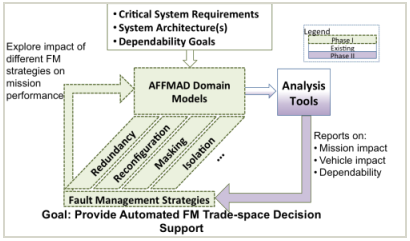
May 2015: Project Start

May 2017: Closed out

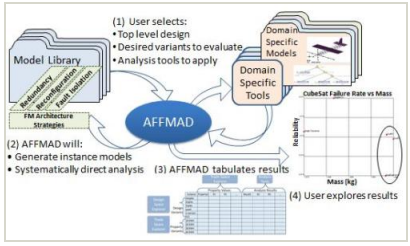
Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/137680)*

Images



Briefing Chart
Architecture Framework for Fault Management Assessment and Design (AFFMAD) Briefing Chart *(https://techport.nasa.gov/image/134703)*



Final Summary Chart Image
Architecture Framework for Fault Management Assessment and Design (AFFMAD), Phase II Project Image *(https://techport.nasa.gov/image/133880)*

Organizational Responsibility

Responsible Mission Directorate:
Space Technology Mission Directorate (STMD)

Lead Organization:
Adventium Enterprises, LLC

Responsible Program:
Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:
Jason L Kessler

Program Manager:
Carlos Torrez

Principal Investigator:
Todd Carpenter

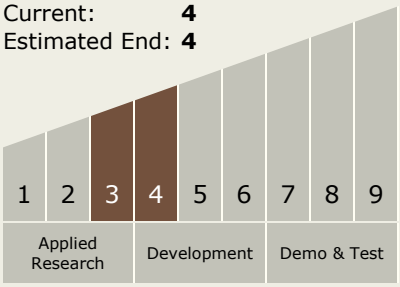
Co-Investigator:
Todd P Carpenter

Architecture Framework for Fault Management Assessment and Design (AFFMAD), Phase II

Completed Technology Project (2015 - 2017)

Technology Maturity (TRL)

Start: **3**
Current: **4**
Estimated End: **4**



Technology Areas

Primary:

- TX04 Robotic Systems
  - TX04.5 Autonomous Rendezvous and Docking
    - TX04.5.1 Relative Navigation Sensors

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System